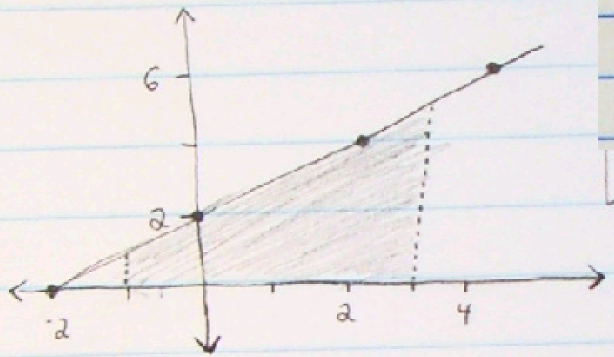
Do these by hand w/o calc.

① $$\int_{-1}^{3} \frac{x^2-4}{x-2}\,dx$$

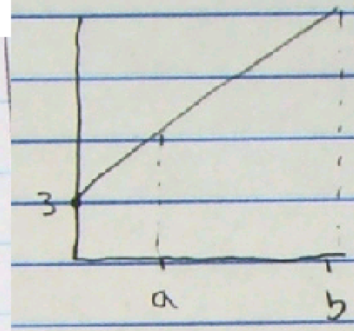
② $$\int_{a}^{b} (2t+3)\,dt \qquad 0<a<b$$

$$\frac{\cancel{(x-2)}(x+2)}{\cancel{(x-2)}} \rightarrow x+2$$




$5 \cdot 5 = 25 \quad 25/2 = 12.5$

$12.5 - 0.5 = 12$



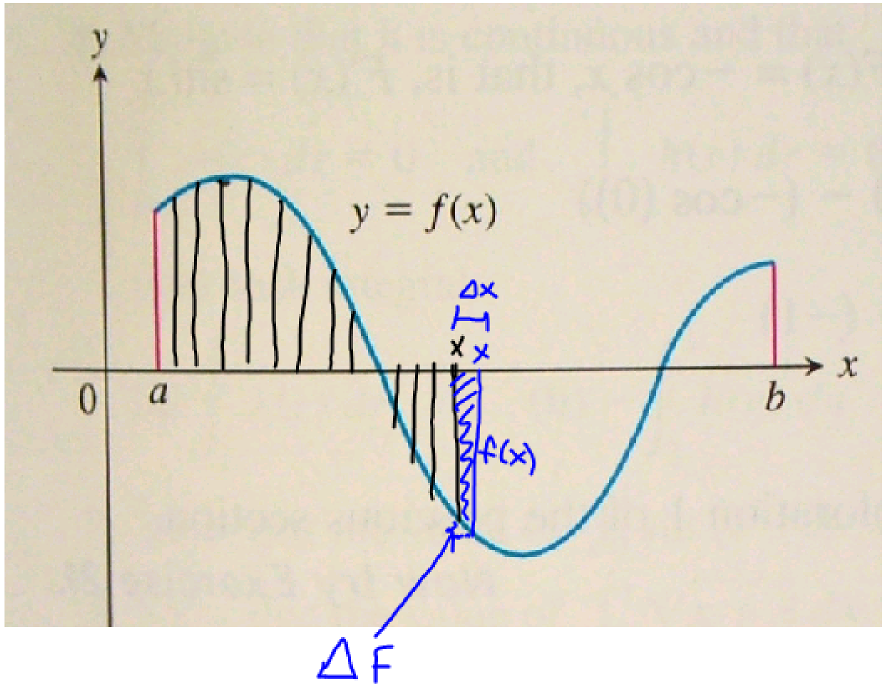

$\frac{1}{2}(2a+3+2b+3)(b-a)$

$(a+b+3)(b-a)$

$\cancel{ab}-a^2+b^2-\cancel{ab}+3b-$

$\boxed{-a^2+b^2+3b-3a}$

$b^2+3b-a^2-3a$




$$\int_a^x f(t)\,\partial t$$

integral is a function of x

F

$$F' = \lim_{\Delta x \to 0} \frac{\Delta F}{\Delta x}$$

$$\Delta F = \Delta x \cdot f(x)$$

$$\frac{\Delta F}{\Delta x} = f(x)$$

$$F'(x) = f(x)$$

$$\frac{\partial}{\partial x} \int_a^x f(t)\,\partial t = f(x)$$

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x).$$

This means that the integral is an *antiderivative* of $f$, a fact we can exploit in the following way.

If $F$ is any antiderivative of $f$, then

$$\int_a^x f(t)\,dt = F(x) + C$$

$x^2+5$

$2x$

for some constant $C$. Setting $x$ in this equation equal to $a$ gives

$$\int_a^a f(t)\,dt = F(a) + C$$

$2x$

$$0 = F(a) + C$$

$x^2 + C$

$$C = -F(a).$$

Putting it all together,

$$\boxed{\int_a^x f(t)\,dt = F(x) - F(a).}$$

antiderivative

$$\int_0^{\pi} \sin x = 2$$

$$\int_0^{\pi} \sin x = -\cos(\pi) - -\cos(0)$$

$$-(-1) + 1 = 2$$

Sect. 5.3

#19-36

(32) $y=\frac{1}{x}$ $[e, 2e]$

$F(x)=\ln x$

$$\frac{\ln 2e-\ln e}{e}$$

$$\frac{\ln\left(\frac{2e}{e}\right)}{e}=\frac{\ln 2}{e}$$

Sect. 5.3

#45-50

Quick Quiz

p. 293 #1-4